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| 10/528,896 | 10/27/2005 | Kevin Dorling | C64-7583 | 8817 |

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EXAMINER

WIEHE, NATHANIEL EDWARD

ART UNIT PAPER NUMBER

3745

DATE MAILED: 12/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/528,896

Applicant(s)

DORLING ET AL.

Examiner

Nathan Wiehe

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-55 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 51-55 is/are allowed.
- 6) ☒ Claim(s) 1-16, 18-50 is/are rejected.
- 7) ☒ Claim(s) 17 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 March 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 03232005.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 23 March 2005 is noted. The submission is in compliance with the provisions of 37 CFR 1.97 and 1.98. Accordingly, the information disclosure statement is being considered by the examiner.

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: angle B (page 12, line 32).

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the circular cross-sectional shape (Claim 4), longitudinally offset chevron junctions (Claim 6), ribs mounted on opposite sides (Claim 7), lateral offset of ribs (Claim 9), offset gaps (Claim 11) and the stator blade configuration (Claim 48) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate

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prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1,3 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beeck et al. (6,343,474), hereinafter "Beeck '474", in view of Lee et al. (6,612,808), hereinafter "Lee". Beeck '474 discloses a turbine blade, which may be a first stage turbine blade of a gas turbine engine (Beeck '474 column 4, line 34), including an internal channel (2) providing a flow passage for a cooling medium. The channel includes a plurality of chevron shaped turbulence promoting ribs (7,17,27). An angle,

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between 80° and 120°, is defined between the two portions of the ribs. The channel of Beeck '474 has a substantially triangular cross-section in a single pass form. Beeck '474 does not disclose the use of gaps within the ribs. Lee discloses turbulence promoting ribs (16) extending from a wall (18) toward the flow of cooling air. Lee's ribs (16) include gaps (20) that may be in-line or offset and are between 1.27mm to .00508 mm wide. These gaps (20) enhance the heat transfer from the ribs by disrupting the boundary layer insulation (Lee column 2, lines 20-23). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the turbulent promoting ribs of Beeck '474 by including gaps in the ribs as taught by Lee in order to enhance the heat transfer of the ribs.

Claims 1,6,31 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beeck et al. (6,068,445), hereinafter "Beeck '445", in view of Lee et al. (6,612,808), hereinafter "Lee". Beeck '445 discloses a triangular cooling channel (3) in a turbine blade (1) including a plurality of turbulent promoting ribs (9). The ribs (9) form a chevron pattern, with one rib portion being perpendicular to the flow path direction, with an angle between 80° to 120° degrees between the rib portions. Beeck '445 further discloses that the junction of the chevron, i.e. the location of deviation, may be spaced from the leading edge between 0%, corresponding to alignment of the chevron junctions along the leading edge, to 15%, corresponding to longitudinal offset of the chevron junctions, of the channel length (Beeck '445 column 3, lines 35-38). When the spacing is 0% of the channel length one rib portion will be located on the pressure will with the other will be located on the suction wall and the junction will be

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aligned with the leading edge. Beeck '445 does not disclose the use of gaps in the ribs. Lee discloses turbulence promoting ribs (16) extending from a wall (18) toward the flow of cooling air. Lee's ribs (16) include gaps (20) that may be in-line or offset and are between 1.27mm to .00508 mm wide. These gaps (20) enhance the heat transfer from the ribs by disrupting the boundary layer insulation (Lee column 2, lines 20-23). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the turbulent promoting ribs of Beeck '445 by including gaps in the ribs as taught by Lee in order to enhance the heat transfer of the ribs.

Claims 1,2,5,7-11,15,16,19,20,29,30,32,34-36,38-46 and 48-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kercher (5,695,321) in view of Lee et al. (6,612,808), hereinafter "Lee". Kercher discloses a turbine blade (10) that may be a stator or rotor blade in a gas turbine that is capable of use in an electrical generating means (Kercher column 3, line 64-column 4, line 4) including opposing pressure (22) and suction (20) walls joined at the leading (24) and trailing (26) edges that cooperate with webs (40,42) to form a plurality of serpentine flow channels (32), including leading edge and mid-passage channels. Kercher specifically shows a turbine blade (10) having a dove tail, fur-tree type root portion (18) that supplies cooling medium, compressed air from a compressor (Kercher column 4, lines 19-22). Kercher utilizes a plurality of chevron shaped turbulent promoting ribs (44) having an angle in the range of 80° to 120° between the rib portions. The ribs (44) are mounted on both opposing sides of the mid-passage channel and have their chevrons aligned longitudinally. The ribs (44) extend at an angle of 90° from the wall surface and have a cross-section generally

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in the form of a parallelogram, specifically square. Kercher does not disclose the use of gaps in the ribs. Lee discloses turbulence promoting ribs (16) extending from a wall (18) toward the flow of cooling air. Lee's ribs (16) include gaps (20) that may be in-line or offset and are between 1.27mm to .00508 mm wide. These gaps (20) enhance the heat transfer from the ribs by disrupting the boundary layer insulation (Lee column 2, lines 20-23). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the turbulent promoting ribs of Kercher by including gaps in the ribs as taught by Lee in order to enhance the heat transfer of the ribs.

Claims 4,12,13 and 21-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kercher (5,695,321) in view of Lee et al. (6,612,808), hereinafter "Lee". Kercher discloses the invention substantially as claimed except for the specific channel cross-section and rib dimensions, spacing and cross-section. Since applicant has not disclosed that have the cross-sections and dimensions solves any stated problem or is for any particular purpose above the fact that these dimensions and cross-sectional shapes meet the required cooling parameters of the specific blade application and it appears that the blade of Kercher would perform equally well with the cross-sectional shapes and dimensions as claimed by applicant, it would have been an obvious matter of design choice to further modify the cooling passage and ribs of Kercher by utilizing the cross-sectional shapes and dimensions as claimed for the purpose of meeting the required cooling parameters of the specific blade application.

Allowable Subject Matter

Claims 51-55 are allowed.

Claim 17 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The instant invention is deemed to be a non-obvious improvement over the invention of U.S. Pat. No. 5,695,321. The improvement comprises the use of turbulence promoting ribs extending from the channel wall surface at an angle greater than 60° and less than 90°, such that the rib is directed into the direction of flow of the cooling medium.

Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The patent issued to Merry discloses arrangements of turbulence promoting ribs in a turbine blade whose dimensions and spacing are determined in dependence of the size and cooling requirements of the specific blade.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan Wiehe whose telephone number is (571)272-8648. The examiner can normally be reached on Mon.-Thur. and alternate Fri., 7am-4:30pm EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Look can be reached on (571)272-4820. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Nathan Wiehe
Examiner
Art Unit 3745



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12/11/06